

What is claimed is:

1. An optical signal receiving apparatus comprising:
a housing;
a plurality of TO-can packaged photo-detectors located on the housing, each of the plurality of TO-can packaged photo-detectors being sensitive to one of a plurality of optical signals, each of the plurality of optical signals having a different wavelength; and
a plurality of wavelength selective filters located within the housing, where each of the plurality of wavelength selective filters directs one of the plurality of optical signals to one of the plurality of TO-can packaged photo-detectors.
2. An optical signal receiving apparatus of claim 1, wherein the housing is connected by a coupling lens to an optical fiber carrying a wavelength division multiplexing signal, wherein the number of different wavelengths carried by the wavelength division multiplexing signal corresponds to the number of the TO-can packaged photo-detectors.
3. An optical signal receiving apparatus of claim 2, wherein the number of wavelengths carried by the wavelength division multiplexing signal is four.
4. An optical signal receiving apparatus of claim 3, wherein each of the wavelengths within the wavelength division multiplexing signal carries data at a rate of approximately 2.5 giga-bits per second.

5. An optical signal receiving apparatus of claim 3, wherein the wavelength division multiplexing signal is a coarse wavelength division multiplexing signal.

6. An optical signal receiving apparatus of claim 3, wherein the wavelength division multiplexing signal is a dense wavelength division multiplexing signal.

7. An optical signal receiving apparatus of claim 2, wherein the each of the plurality of TO-can packaged photo-detectors is an optical fiber.

8. An optical signal receiving apparatus of claim 2, wherein the wavelength selective filters are multi-layered dichroic filters.

9. An optical signal transmitting apparatus comprising:
a housing;
a coupling lens connected to the housing;
a plurality of TO-can packaged laser sources located on the housing, where each of the plurality of TO-can packaged laser sources generates one of a plurality of optical signals, each of the plurality of optical signals having a different wavelength; and
a plurality of wavelength selective filters located within the housing, where the plurality of wavelength selective filters directs one of the plurality of optical signals from one of the plurality of TO-can packaged laser sources towards the coupling lens.

10. An optical signal transmitting apparatus of claim 9, wherein the housing is connected by the coupling lens to an optical fiber carrying a

wavelength division multiplexing signal, wherein the number of different wavelengths carried by the wavelength division multiplexing signal corresponds to the number of the TO-can packaged photo-detectors.

11. An optical signal transmitting apparatus of claim 10, wherein the number of wavelengths carried by the wavelength division multiplexing signal is four.

12. An optical signal transmitting apparatus of claim 11, wherein the wavelength division multiplexing signal is one of a coarse wavelength division multiplexing signal and a dense wavelength division multiplexing signal.

13. An optical signal transmitting apparatus of claim 9, wherein the each of the plurality of TO-can packaged laser sources is replaced by an optical fiber.

14. An optical signal transmitting apparatus of claim 9, wherein the wavelength selective filters are multi-layered dichroic filters.

15. A method of transmitting a wavelength division multiplexing signal, the method comprising:

applying an input signal to a number of TO-can packaged laser sources located on a housing;

generating a plurality of optical signals, where each of the plurality of optical signals has a different wavelength;

transmitting each of the plurality of optical signals to one of a plurality of wavelength selective filters where the plurality of wavelength selective filters is located within the housing; and

directing each of the plurality of optical signals to a coupling lens where the coupling lens connects the housing to an optical fiber.

16. The method of transmitting a wavelength division multiplexing signal of claim 15, wherein the number of wavelengths carried by the wavelength division multiplexing signal is four.

17. The method of transmitting a wavelength division multiplexing signal of claim 15, wherein the plurality of wavelength selective filters are multi-layered dichroic filters.

18. The method of transmitting a wavelength division multiplexing signal of claim 15, wherein applying the input signal to the number of TO-can packaged laser sources is done using a de-multiplexer.

19. The method of transmitting a wavelength division multiplexing signal of claim 15, wherein the wavelength division multiplexing signal is one of a coarse wavelength division multiplexing signal and a dense wavelength division multiplexing signal.

20. The method of transmitting a wavelength division multiplexing signal of claim 15, wherein each of the wavelengths within the wavelength division multiplexing signal carries data at a rate of approximately 2.5 gigabits per second.

21. A method of receiving a wavelength division multiplexing signal from an optical fiber, where the wavelength division multiplexing signal comprises of a plurality of signals, each of the plurality of signals having one of a plurality of wavelengths, the method comprising:

transmitting the wavelength division multiplexing signal through a coupling lens connecting the optical fiber to a housing;

transmitting the wavelength division multiplexing signal towards a plurality of wavelength selective filters located within the housing, where each of the plurality of wavelength selective filters is partially reflective at one of the plurality of wavelengths; and

directing the one of the plurality of signals to one of a plurality of TO-can packaged photo-detectors.

22. The method of receiving a wavelength division multiplexing signal of claim 21, wherein the one of the plurality of TO-can packaged photo-detectors is sensitive to the wavelength of the one of the plurality of signals.

23. The method of receiving a wavelength division multiplexing signal of claim 21, wherein the each of the plurality of TO-can packaged photo-detectors is replaced by an optical fiber.

24. The method of receiving a wavelength division multiplexing signal of claim 21, wherein the number of the TO-can packaged photo-detectors is four.

25. The method of receiving a wavelength division multiplexing signal of claim 21, wherein each of the plurality of signals carries data at a rate of approximately 2.5 giga-bits per second.

26. An optical signal transmitting apparatus, comprising:
- a housing;
 - a coupling lens connected to the housing;
 - a TO-can packaged laser source located on the housing, where the TO-can packaged laser source generates an optical signal;
 - a partially reflective mirror located within the housing, where the partially reflective mirror directs portions of the optical signal from the TO-can packaged laser source towards (1) the coupling lens and (2) a second wavelength selective filter;
 - a wavelength selective filter located within the housing where the second wavelength selective filter directs portions of the optical signal from the partially reflective mirror to each of a plurality of TO-can packaged photodiodes located on the housing, where the plurality of TO-can packaged photodiodes generates a plurality of electrical signals in response to the optical signal from the wavelength selective filter; and
 - a controller coupled to the TO-can packaged laser source and the plurality of the TO-can packaged photodiodes, where the controller receives the plurality of electrical signals from the plurality of TO-can packaged photodiodes and in response to the plurality of electrical signals changes the operating parameters of the TO-can packaged laser source.
27. An optical signal transmitting apparatus of claim 26, wherein the coupling lens is connected to an optical fiber.
28. An optical signal transmitting apparatus of claim 26, wherein the housing is made of a solid block of one of (1) silicon, (2) glass, and (3) optically transparent plastic.

29. An optical signal transmitting apparatus of claim 26, wherein the housing is made of a shell of one of (1) steel, (2) plastic, and (3) ceramic.

30. An optical signal transmitting apparatus of claim 26, wherein the wavelength selective filter is a multi-layered dichroic filter.

31. An optical signal transmitting apparatus of claim 26, wherein the optical signal carries data at a rate of approximately 2.5 gig-bits per second.

32. An optical signal transmitting apparatus of claim 26, wherein the number of the plurality of TO-can packaged photodiodes is two.

33. An optical signal transmitting apparatus of claim 32, wherein the wavelength selective filter (1) directs optical signal of a first percentage to a first of the of the plurality of TO-can packaged photodiodes and directs the remainder of the optical signal to the second of the plurality of TO-can packaged photodiodes when the wavelength of the optical signal is equal to a first wavelength, (2) directs higher than the first percentage of optical signal to the first of the plurality of photodiodes when the wavelength of the optical signal is higher than the first wavelength, and (3) directs lesser than the first percentage of optical signal to the first of the plurality of photodiodes when the wavelength of the optical signal is lower than the first wavelength.

34. A method of transmitting an optical signal, the method comprising:

applying a first electrical signal to a TO-can packaged laser source located on a housing;

generating an optical signal in response to the first electrical signal;

transmitting the optical signal towards a partially reflective mirror located within the housing;

directing a first portion of the optical signal received at the partially reflective mirror towards an optical lens connected to an optical fiber and directing a second portion of the optical signal received at the partially reflective mirror towards a wavelength selective filter;

directing a third portion of the optical signal received at the wavelength selective filter towards a first TO-can packaged photodiode and directing a fourth portion of the optical signal received at the wavelength selective filter towards a second TO-can packaged photodiode;

generating a second electrical signal in response to the third portion of the optical signal received at the first TO-can packaged photodiode and generating a third electrical signal in response to the fourth portion of the optical signal received at the second TO-can packaged photodiode;

measuring the parameters of the second electrical signal and the third electrical signal; and

adjusting the operating parameters of the TO-can packaged laser source in response to the measured parameters of the second electrical signal and the third electrical signal.

35. A method of transmitting an optical signal of claim 34, further comprising transmitting the first portion of the optical signal received at the coupling lens into an optical fiber.

36. A method of transmitting an optical signal of claim 34, wherein adjusting the operating parameters of the TO-can packaged laser source comprises adjusting the amount of current and the frequency of the first electrical signal applied to the TO-can packaged laser source.

37. A method of transmitting an optical signal of claim 34, wherein the optical signal carries data at a rate of approximately 2.5 giga-bits per second.

38. A method of transmitting an optical signal of claim 34, wherein the optical signal carries data in a wavelength division multiplexing format.

39. A method of transmitting an optical signal of claim 34, wherein (1) the third portion of the optical signal received at the first TO-can packaged photodiode is approximately equal to a first percentage of the optical signal received at the wavelength selective filter when the wavelength of the optical signal is equal to a first wavelength, (2) the third portion of the optical signal received at the first TO-can packaged photodiode is higher than the first percentage of the optical signal received at the wavelength selective filter when the wavelength of the optical signal is higher than the first wavelength, and (3) the third portion of the optical signal received at the first TO-can packaged photodiode is lower than the first percentage of the optical signal received at the wavelength selective filter when the wavelength of the optical signal is lower than the first wavelength.

40. An optical signal transmitting apparatus, comprising:

a housing;

a coupling lens connected to the housing;

a plurality of TO-can packaged laser sources located on the housing, where each of the plurality of TO-can packaged laser sources receives one of a first plurality of electrical signals and generates one of a plurality of optical signals, each of the plurality of optical signals having a different wavelength;

a first plurality of wavelength selective filters located within the housing, where the first plurality of wavelength selective filters directs the plurality of optical signals towards the coupling lens;

a partially reflective mirror located within the housing, where the partially reflective mirror directs portions of the optical signals from the first plurality of wavelength selective filters towards (1) the coupling lens and (2) a fourth wavelength selective filter;

the fourth wavelength selective filter is located within the housing, where the fourth wavelength selective filter directs a part of each of the plurality of partially reflected optical signals towards one of a plurality of TO-can packaged photodiodes located on the housing, where each of the plurality of TO-can packaged photodiodes generates one of a second plurality of electrical signals in response to the part of the one of the plurality of partially reflected optical signals; and

a controller coupled to the plurality of TO-can packaged laser sources and the plurality of TO-can packaged photodiodes, where the controller receives the second plurality of electrical signals from the plurality of TO-can packaged photodiodes and in response to the second plurality of electric signals changes operating parameters of the plurality of TO-can packaged laser sources.

41. An optical signal transmitting apparatus of claim 40, wherein the operating parameters of the plurality of TO-can packaged laser sources include one of (1) temperature of the plurality of TO-can packaged laser sources and (2) electric current of the first plurality of electric signals applied to the plurality of TO-can packaged laser sources.

42. An optical signal transmitting apparatus of claim 40, wherein the number of TO-can packaged laser sources in four.

43. An optical signal transmitting apparatus of claim 42, wherein each of the plurality of optical signals carries data at a rate of approximately 2.5 giga-bits per second.

44. An optical signal transmitting apparatus of claim 40, wherein the housing is made of a solid block of one of (1) silicon, (2) glass, and (2) optically transparent plastic.

45. An optical signal transmitting apparatus of claim 40, wherein the housing is made of a shell of one of (1) steel, (2) plastic, and (3) ceramic.

46. An optical signal transmitting apparatus of claim 40, wherein the plurality of wavelength selective filters are multi-layered dichroic filters.

47. An optical signal transmitting apparatus of claim 40, wherein each of the plurality of optical signals includes a calibrating overtone signal.

48. An optical signal transmitting apparatus of claim 40, wherein each of the plurality of the optical signal is a calibrating signal during a calibration period.

49. An optical signal transmitting apparatus of claim 40, wherein the fourth wavelength selective filter has a wavelength to reflectivity profile of one of (1) linear form and (2) saw-tooth form.

50. A method of transmitting an optical signal, the method comprising:

applying a first plurality of electrical signals to a plurality of TO-can packaged laser sources located on a housing;

generating a plurality of optical signal in response to the first plurality of electrical signals where each of the plurality of optical signals is of different wavelength;

directing the plurality of optical signals towards a coupling lens connected to the housing;

directing a first portion of the each of the plurality of optical signals directed towards the coupling lens to a wavelength selective filter located within the housing;

directing a first percentage of the each of the plurality of optical signals directed towards the wavelength selective filter to a first TO-can packaged photodiode located on the housing;

directing a second percentage of the each of the plurality of optical signals directed towards the wavelength selective filter to a second TO-can packaged photodiode located on the housing;

generating a second plurality of electrical signal in response to the first percentage of the each of the plurality of optical signals directed towards the first TO-can packaged photodiode;

generating a third plurality of electrical signal in response to the second percentage of the each of the plurality of optical signals directed towards the second TO-can packaged photodiode;

measuring the parameters of the second plurality of electrical signal and the third plurality of electrical signal; and

adjusting the operating parameters of the plurality of TO-can packaged laser sources in response to the measured parameters of each of the second plurality of electrical signal and the third plurality of electrical signal.

51. A method of transmitting an optical signal of claim 50, further comprising transmitting a second portion of each of the plurality of the optical signals directed towards the coupling lens into an optical fiber.

52. A method of transmitting an optical signal of claim 50, wherein each of the plurality of optical signals includes a calibrating overtone signal.

53. A method of transmitting an optical signal of claim 50, wherein each of the plurality of the optical signal is a calibrating signal during a calibration period.

54. A method of transmitting an optical signal of claim 50, wherein adjusting the operating parameters of the plurality of TO-can packaged laser sources comprises one of (1) adjusting temperature of the plurality of TO-can packaged laser sources and (2) adjusting electric current of the first plurality of electric signals applied to the plurality of TO-can packaged laser sources.

55. A method of transmitting an optical signal of claim 50, wherein each of the plurality of optical signals carries data at a rate of approximately 2.5 giga-bits per second.

56. A method of transmitting an optical signal of claim 50, wherein each of the plurality of the optical signals carries data in a wavelength division multiplexing format.

57. A method of transmitting an optical signal of claim 50, wherein the wavelength selective filter has a wavelength to reflectivity profile of one of (1) linear form and (2) saw-tooth form.